

another's discoveries, and hinted that few of the latter are worthy of acceptance. The main object of the book is said to be to try to prove that "heat is not a vibration of material, not even of aether," but we search in vain for a clear alternative definition. It is a difficult book to follow because of the entire lack of order. The whole is an intricate mixture of simple experimental facts, quotations from books on many subjects, some of which are very remotely connected with heat, and a large amount of astounding new theory. Most of the ordinary phenomena in heat are dealt with, and a chapter in defence of the British systems of measurement is included. We can neither recommend the book to beginners—for it would confuse them—nor to those conversant with the subject—for it would waste their time.

(2) The two little books on practical science are for use in elementary schools, and the authors claim that the scheme has already been thoroughly tested with success. Part i. consists of a series of exercises in measurements of length, area, volume, weight, and density. Part ii. contains rather more advanced exercises on the same subjects, together with some on atmospheric pressure and heat, and a suggested course of woodwork. The exercises do not consist of detailed instructions of what to do and expect, but require some initiative on the part of the student. This is, indeed, the intention of the authors, who hold the view that the pupil should discover facts for himself. Thus, some of the exercises simply consist of a series of questions to be answered by making experiments. The books, although cheap, are clearly printed, and will probably be found to serve their purpose.

(3) Dr. Neesen has undertaken a difficult task in dealing with such a large subject in so small a volume. Nevertheless, most of the phenomena proper to the various subjects are referred to, although briefly. With a few exceptions, the book is non-mathematical, and deals rather with the experimental side. The reader, therefore, has no need of an advanced knowledge of physics, and it is doubtless advantageous for such to study the different kinds of wave motion together. Besides the subjects mentioned in the title, there are several paragraphs on radioactivity, in which the properties of the α , β , and γ rays are dealt with. Many of the diagrams are poorly drawn and printed. This is particularly unfortunate in a book dealing with wave motion and geometrical optics.

(4) Quite otherwise in this respect are the two textbooks of physics by Dr. Stewart. That on sound especially should supply the much-felt need of an elementary treatment of that subject. Exception may be taken to the definition of simple harmonic motion as the projection on a diameter of the uniform circular motion of a point, because it leads students to believe in the existence of such a point in all cases of simple harmonic motion. It is rather surprising, also, to find Doppler's principle and the production of beats not referred to, especially as the latter is so commonly used as a method of estimating frequencies. Omissions are the chief fault in these volumes, and they are even more frequent in the part on light. There is no treatment of microscopes and telescopes,

nor the methods of measuring the velocity of light. These are surely not out of place even in an elementary text-book. In reading this part alone it is noticeable that the undulatory theory is not sufficiently insisted upon, but this is compensated for by the fact that the laws of refraction and reflection are proved according to this theory in the volume on sound. On the whole, however, the books are distinctly good, and the large number of experiments suggested will no doubt serve to demonstrate the principles involved.

VOLUMETRIC CHEMICAL ANALYSIS.

A Manual of Volumetric Analysis. For the Use of Pharmacists, Sanitary and Food Chemists, as well as for Students in these Branches. By Dr. H. W. Schimpf. Fifth edition, revised and enlarged. Pp. xx+725 (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1909.) Price 21s. net.

THE plan of this work is as follows:—First, the general principles of volumetric chemical analysis are explained and illustrated. Next, the knowledge thus gained is applied to practice-work upon the commoner inorganic elements and their chief compounds, and upon certain organic acids. Finally, two branches of specialised work are taken up—namely, the analysis of various food-stuffs and pharmaceutical products—and the book concludes with a few examples of gasometric analysis applied to articles met with in pharmacy and medicine.

The treatment is generally fairly exhaustive, and the descriptions lucid. Often, indeed, the author gives almost a superabundance of detail in explaining the principles of the methods used. For example, he supplies not only the equations involved, but frequently the arithmetic as well. In the early part of the book he appears to have in mind the very elementary student, and is at some pains to explain such matters as the law of definite proportions. This seems hardly necessary in a book of this character. Knowledge of the elementary principles on the part of the student might well be taken for granted. In fact, the author is scarcely consistent; a page or two later on we find ourselves talking of univalent and divalent compounds, monobasic and dibasic acids, without previous explanation of the terms. A reader who knows what they mean would not be likely to want an exposition of the law of definite proportions.

A very useful description of the properties of indicators is contained in the fourth chapter. The reactions involved are dealt with mainly as ionisation phenomena, but a brief explanation is given of the chromophoric theory also.

The special feature of the volume, however, is the amount of attention devoted to the assaying of pharmaceutical preparations, particularly alkaloidal drugs. No fewer than a hundred and fourteen pages are taken up with these, and the sections appear to have been brought well abreast of modern practice. One division treats of the general volumetric estimation of alkaloids, explaining the principles, and describing some of the newer methods, as well as those which are older and better known. Afterwards comes a

chapter dealing with the extraction of alkaloids from the various crude drugs—seeds, leaves, roots—in which they occur, and the determination of the proportion present. This is followed by sections which treat of the individual drugs and the galenical preparations containing them. The alkaloids of gelsemium, hyoscyamus, stramonium, coca, colchicum, conium, hydrastis, ipecacuanha, physostigma, pilocarpus, tobacco, strophanthus, and veratrum are included, as well as the commoner alkaloids, and this part of the work should be a boon to chemists or students interested in the examination of these products.

The space allotted to the analysis of water and food-stuffs does not allow of the articles being discussed at any length. Milk, butter, oils and fats, starch, and sugar are dealt with, and the outlines of principles and processes given are trustworthy as far as they go.

For the sake of the numerous references which the author supplies, one can readily forgive him his occasional lapses into slipshod English. The book contains a wealth of information, and considered as a whole is an excellent production. C. S.

OUR BOOK SHELF.

Geologischer Führer durch Dalmatien. By Dr. R. Schubert. Pp. xxiv+176. (Berlin: Borntraeger, 1909.) Price 5.60 marks.

THERE are few portions of the map of Europe more attractive to the eye of the geographer and the geologist than the coast of the northern Adriatic. On the one hand we have the coast of deposition, starting from the Apennine foothills north of Pesaro, and more and more emphasised in the swampy flats of Ravenna and Venice, until we reach the jungle-like woods of Monfalcone. Beyond this we come against steeply descending limestone hills, with a "karst" character already manifest. The blue water at Trieste speaks of the coast of subsidence that stretches to the south-east, with chains of islands parallel with the tectonic features of the land.

Dr. Schubert sums up the geological features of Dalmatia in a work intended for the instructed traveller. Cretaceous limestones play a large part in the country, but are concealed over much of the north by fresh-water and marine Eocene strata. The marine limestones of Middle Eocene age are here overlapped by the brackish-water marls and fluviatile conglomerates of the Promina series, which were laid down in Upper Eocene, and possibly finally in Oligocene, times, after a general uplift of the area (p. xvii). The Eocene sea itself had represented a return to marine conditions after a terrestrial and lagoon stage which closed the local Cretaceous system. The folding from north-east to south-west, which has determined the salient features of modern Dalmatia, took place in Oligocene times (p. 173).

While the corresponding depression of the Adriatic may have begun, through the production of faults, soon after the Oligocene period, the sea did not invade the northern part of its present basin until what we may call human times. The Po and its tributaries, dependent on the growth of the Alpine chain, carried detritus across this area, and the sinking that has separated the alluvial Italian region from the rocky shore of Istria began in the Glacial and continued into the Roman epoch. The chains of islands off the Dalmatian coast have thus a very modern origin.

Dr. Schubert guides the traveller on a series of excursions, with useful notes as to the accommodation on the way. He wisely points out that a knowledge of either Italian or Croatian, preferably the latter, is essential for those who go beyond the tourist routes. The price of his compact volume, with its numerous references to other literature, will not seem high, when one considers how long it will be before any large number of visitors will venture far from the comfortable steamers on the coast. The desire for luxury during travel fortunately leaves many European districts, like Dalmatia, free for those who prefer to study and observe at their own leisure.

G. A. J. C.

Entwicklung und Untergang des Kopernikanischen Weltsystems bei den Alten. By O. T. Schulz. Pp. 143. (Stuttgart, Verlag: Neue Weltanschauung, 1909.)

THIS essay is the first of a series entitled "Weltanschauungs-Fragen." It deals with the ideas of the Greeks about the construction of the world, but, notwithstanding the title, the standpoint of the author is that of an historian of geography, and not that of an historian of astronomy. He is evidently quite at home when sketching the gradual rise of geographical knowledge and illustrating it by maps. But when he comes to the astronomical part of his subject he has apparently only Zeller's "Philosophie der Griechen" and Schiaparelli's memoir on the precursors of Copernicus to build on, while Schiaparelli's later paper on the very subject indicated by the title of the present essay, as well as the writings of Tannery, Hultsch, and others, are unknown to him.

The author makes no attempt to point out how Aristarchus may have been led to the idea of the earth's motion round the sun, and tells the reader nothing about the systems of movable excentrics or epicycles. He states that Aristarchus at first believed in the motion of the sun round the earth, and that he says so in his little book on the distances of the sun and moon. But there is not a word in this book as to whether the sun or the earth is in motion. As regards the failure of the heliocentric idea to secure acceptance, the only reason given by the author is that Hipparchus considered it not to be based on sufficiently lengthy observations. We cannot imagine where the author got this piece of information from, as there is no allusion to the system of Aristarchus in the preserved writings of Hipparchus and Ptolemy. What Hipparchus did say was that he did not himself possess sufficient observations to work out the theory of the orbital inequalities of the five planets. But these have nothing to do with the motion of the earth. The author adds that there is no original research in the *Almagest*!

When dealing with the views of Plato, the author repeats the statements current sixty years ago about Plato's doctrine respecting the rotation of the earth and about his change of opinion in his old age as to which body was in the centre of the world. One cannot help wondering whether it really is of any use to try to kill historical errors. They seem to be immortal. At least, popular writers on the history of science are generally not aware that they are dead and buried long ago. J. L. E. D.

Excursionsbuch zum Studium der Vögelstimmen. By Prof. Voigt. Pp. 326. (Leipzig: Quelle und Meyer, n.d.) Price 3 marks.

THIS is the fifth edition of an excellent manual of the songs and other notes of birds, suitable for carrying in the pocket during walks and excursions. As a matter of fact, it is better for the learner to find out for himself